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## **Education**

### **Diabetes Mellitus: Type 2**

#### **What is type 2 diabetes mellitus?**

Type 2 diabetes is a disorder that happens when your body does not make enough insulin or is unable to use insulin properly. The inability to use your insulin is called insulin resistance. This problem with insulin causes the level of sugar in your blood to become abnormally high.

When you digest food, your body breaks down much of the food into sugar (glucose). Your blood carries the sugar to the cells of your body for energy. The pancreas gland makes insulin, which helps move the sugar from the bloodstream into the cells.

When your body does not have enough insulin or cannot use insulin properly, sugar cannot get into your cells. Sugar builds up in your blood. Too much sugar in your blood can cause many problems. These problems can be life-threatening if they are not treated. However, proper treatment can control your blood-sugar level.

Type 2 diabetes occurs mostly in adults over age 40, especially overweight adults. Overweight children and adolescents can also have this type of diabetes. More people, including children and adolescents, are becoming diabetic as more people become overweight.

Many millions of people in the US are diabetic. Most of them have type 2 diabetes. Although type 2 diabetes occurs in all races, it occurs most often among Native Americans, Hispanics, African Americans, and Asian Americans.

#### **How does it occur?**

The cause of type 2 diabetes is not known, although age, weight, lack of exercise, and a high-calorie diet appear to be important factors. As people become older or overweight, they are more likely to have diabetes. Their cells become unable to use the insulin made by the pancreas.

Women who have given birth to large babies (for example, babies weighing 9 pounds or more), or who have had diabetes of pregnancy (gestational diabetes), have a higher risk of developing type 2 diabetes later in life.

Also, if your parents have had type 2 diabetes, your chance of developing type 2 diabetes is much higher.

#### **What are the symptoms?**

Type 2 diabetes may cause the following symptoms:

- increased urination
- increased thirst
- increased appetite
- unexpected weight gain or weight loss
- blurred vision
- skin infections
- vaginal infections
- tiredness
- slowly healing sores
- abnormal feelings of prickling, burning, or itching of the skin, usually on the hands or feet
- infections of the foreskin in uncircumcised men.

Most people, however, have no symptoms, especially at first.

## How is it diagnosed?

Your health care provider will ask about your medical history and your symptoms and examine you. He or she will test the level of sugar in your blood. Two blood tests may be done to diagnose diabetes: the fasting plasma glucose test (FPG) or the oral glucose tolerance test (OGTT). The FPG test is easier, faster, and less expensive to do. A sample of your blood is tested in the morning before you have eaten anything. If this test shows you have a fasting blood sugar of 126 milligrams per deciliter (mg/dL) or more, you may be diabetic. Often a second test will be done after you have fasted since your evening meal and all night. If this second test confirms your high blood sugar, your provider will diagnose type 2 diabetes.

For the glucose tolerance test, a sample of your blood is taken when you have not eaten anything since the night before. Then you drink a special sugar drink and your blood is tested 2 hours again later. If after 2 hours your blood sugar level is 200 mg/dL or higher, you are diabetic.

## How is it treated?

The goal of treatment is to control the level of sugar in your blood. You want to try to keep the sugar level in a normal range. This is done by:

- measuring your blood sugar regularly
- good nutrition and meal planning
- exercise
- medicine, including pills and/or insulin, if you are not able to control your blood sugar through diet and exercise.

## Blood sugar measurements

You will learn how to check your blood sugar at home. You will need a blood glucose meter. The meter is a small machine that tests your blood sugar. You will need some lancets (little blades to prick your finger) and some test strips to put a drop of blood on. Your health care provider will tell you when and how often you need to check your blood sugar.

When you have just been diagnosed with diabetes you will need to check your blood sugar more often. After you have your diabetes under control, your provider will tell you how you can decrease your sugar checks.

Keep a log of your blood sugar measurements. Your provider will check the log at your appointments to see how well your treatment is working.

A blood test called hemoglobin A1c can show your average blood sugar control over the past 3 months. Your health care provider may do this test every 3 months to check your overall control of your blood sugar level. This is the best way to see if you are keeping your diabetes under control.

## Meal planning

Your health care provider or a dietitian will give you clear guidelines about which foods you should eat and how many calories you should eat each day. If you are overweight, losing weight will help you decrease your blood sugar. Choosing healthy foods for your diet will help you lose weight. Sometimes losing just 7 to 10 pounds can reduce or eliminate your need to take medicine for diabetes.

## Exercise

Physical activity is important in managing type 2 diabetes. Exercise is sometimes all some diabetics need to do to control their blood sugar. Exercise improves your circulation, uses up more sugar in your blood, and helps your body use insulin more efficiently. Walking is one of the best exercises you can do. Ask your health care provider for exercise recommendations.

## Medicine

If you can't control your blood sugar with diet and exercise, your health care provider will prescribe medicine to lower your blood sugar. You may need more than one type of medicine to keep your blood sugar in the normal range.

Common blood-sugar-lowering medicines taken by mouth for type 2 diabetes are:

- Sulfonylureas, which help your pancreas release more insulin. Examples of this type of medicine are tolbutamide (Orinase), tolazamide (Tolinase), glyburide (DiaBeta, Glynase, Micronase), glipizide (Glucotrol), and glimepiride (Amaryl). These medicines are taken by mouth 1 to 3 times a day.
- Repaglinide (Prandin) and nateglinide (Starlix), which also help release more insulin. They are taken by mouth before meals.
- Metformin (Glucophage), which helps the body use insulin better. This medicine is taken by mouth 2 to 3 times a day. It may be combined with a sulfonylurea medicine or insulin.

- Rosiglitazone (Avandia) and pioglitazone (Actos), which help the body use insulin better. They are taken by mouth once a day and may be combined with sulfonylureas, metformin, or insulin. While you are taking either of these medicines, you will have blood tests to check the effect on your liver.
- Acarbose (Precose) and miglitol (Glyset), which slow absorption of sugars from the digestive system.

Insulin is used when diet, exercise, and oral medicines are not keeping your blood sugar levels normal. Insulin is available in different forms. It may be short, intermediate, long, or fast acting. It is usually given as a shot.

If you need insulin, your provider will teach you how to give shots to yourself. You may need a shot 1 to 4 times a day. Premixed insulin combines short-acting and intermediate-acting forms in 1 dose (in 1 needle and syringe). No other insulins can be given in a syringe with the long-acting insulin glargine (Lantus).

When you are using any type of diabetic medicine, you must carefully follow your provider's directions for checking your blood sugar. This will not only help you achieve good blood sugar control, but it will help you prevent possibly life-threatening low blood sugar (hypoglycemia).

### **How long will the effects last?**

Exercising more and not overeating can often help the body restore its balance of sugar and insulin. For some people, weight loss is all that is needed for treatment. You may not need to start or continue taking medicine. Your improvement depends on following the diet and exercise plans prescribed by your health care provider to keep your blood sugar in the recommended range.

Taking good care of yourself to avoid complications is especially important with diabetes. Possible diabetic complications include heart disease, stroke, blindness, kidney failure, and nerve damage, especially to your feet and legs. Carefully controlling your blood sugar and blood pressure will delay or prevent these complications. Also make sure you get yearly tests to check your kidneys. For example:

- The urine protein test should be done every year to check for microalbumin, a type of protein.
- A blood test to check creatinine should be done at least once a year.

Many people with type 2 diabetes have other conditions that further increase their risk for heart disease. The 4 conditions listed below are known together as metabolic syndrome:

- diabetes or prediabetes (prediabetes is defined by a fasting blood sugar between 100 and 125 mg/dL)
- obesity, especially if much of your weight is carried around the abdomen ("central obesity")
- abnormal blood lipid (fats) level: that is, a triglyceride level higher than 150 or an HDL level that is below 40 for men or below 50 for women
- high blood pressure (130/85 or higher).

You are considered to have metabolic syndrome if you have 3 or more of these conditions. If you have metabolic syndrome, you are at very high risk of heart disease. For this reason it is very important to discuss these conditions with your health care provider. You may need to work with your provider to decrease your risk of heart disease.

### **How can I take care of myself?**

Follow your diet plan.

- Learn how to make healthy choices when you eat out.
- Ask for diabetic meals when you travel (for instance, at hotels or on planes).
- Drink water or other noncaloric drinks when you have the urge to eat between meals.
- Avoid compulsive eating.
- Limit the amount of alcohol you drink.
- Buy only the types of food included in your diet plan.
- Eat on a regular schedule.
- Eat slowly and chew your food thoroughly.

Follow your health care provider's advice for physical activity.

- Choose activities you like.
- Exercise with friends.

Do not smoke. Smoking speeds up the damage to the heart and blood vessels.

Carefully follow the instructions your provider has given you for taking any medicine he or she has prescribed.

Other things you can do are:

- Learn how to do proper foot care every day.
- Always carry identification that says you have diabetes, in case of an emergency.
- Have a dilated eye exam by an eye doctor soon after you are diagnosed and every year after that. If you have eye problems from diabetes, you may need to be examined more often. Women who become pregnant should have their eyes checked each trimester because diabetic eye problems can worsen quickly during pregnancy.

Learn about diabetes and its complications so you can make the correct decisions to control your blood-sugar levels. Many hospitals have diabetes educators and dietitians who can help you. Ask your health care provider to refer you to these people.

You can get pamphlets and information about diabetes, including diabetic cookbooks, from:

The American Diabetes Association  
Phone: 800-DIABETES (800-342-2383)  
Web site: <http://www.diabetes.org>

### **How can I help prevent type 2 diabetes?**

Even if there is a history of diabetes in your family, you may be able to avoid developing the disease if you:

- Maintain your recommended weight.
- Exercise regularly according to your health care provider's recommendations.
- Eat a healthy diet.

If you have a family history of diabetes, you should get your blood sugar checked every year.

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